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10/596,382	06/12/2006	Rui Pedro Amaral Rodrigues	NL031481	5924

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EXAMINER	
OTTO, JR, PAUL R	

ART UNIT	PAPER NUMBER
4146	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/596,382	RODRIGUES ET AL.	
	Examiner	**Art Unit**	
	PAUL OTTO, JR	4146	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-14 are pending for this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 9, 10, 11, 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramamoorthy (U.S Patent Publication No. 20020085219), in view of Fitzgibbon et al. ("Multibody Structure and Motion: 3-D Reconstruction of Independently Moving Objects," Lecture Notes in Computer Science, Published by Springer Berlin, Volume 1842/2000, Pages 891-906, herein after "Fitzgibbon").

4. As to claim 1, Ramamoorthy discloses "Method of providing contour information related to images, comprising the steps of: obtaining a set of interrelated images (I.sub.1, I.sub.2, I.sub.3), **(Ramamoorthy, [0017], lines 1-3, where "image data sets associated with an object" is read as "interrelated images" because each set is read as an image)** , (step 26),segmenting said images, **(Ramamoorthy,[0059], lines**

23-26, where removal of the background is read as segmenting the images), (step 28), extracting at least two contours (10, 12, 14) from the segmentation, **(Ramamoorthy, [0129], lines 3-5 where "contours of each positive pixel group" is read as "at least two contours" further this process occurs in element 182 for figure 7 which is after the background removal, or segmentation in element 178)**, (step 30) selecting interest points (J.sub.1-J.sub.12) on at least some of the contours, **(Ramamoorthy, [0133], lines 2-4, where contour points are read as interest points)**, (step 32), associating, for said extracted contours, interest points (J) with corresponding reconstructed points by means of three-dimensional reconstruction, **(Ramamoorthy, [0156], lines 1-3, where transformed contours is read as extracted contours and the contour points are read as the interest points)**, (step 34), such that at least a reasonable part of a contour of an object can be determined based on the linked points **(Ramamoorthy,[0156], lines 1-3 where "a three-dimensional surface model estimate" which is derived from "transformed contours" is read as "a reasonable part of a contour of an object" that the set of N points [0150] from the "transformed contours" is read as the "linked points")**."

Ramamoorthy does not specifically disclose "projecting the reconstructed points (P.sub.1-P.sub.12) into each image, (step 36), and linking, for each image, reconstructed points that are not projected at a junction point between different contours or their projections to each other in order to provide a first set of links, (step 38)."

Fitzgibbon, however, specifically discloses “projecting the reconstructed points (P.sub.1-P.sub.12) into each image, **(Fitzgibbon, section 3.2, paragraph 1, lines 3-5, where “3D point Xp” is read as the reconstructed point)** (step 36), and linking, for each image, reconstructed points that are not projected at a junction point between different contours or their projections to each other in order to provide a first set of links, (step 38), **(Fitzgibbon, section 3.1, paragraph 1, lines 8-10, where “3D point” is read as the reconstructed point, tracks are read as “linking”, and the interface between the background and foreground objects are read as “a junction point between different contours”).**”

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Fitzgibbon with the teachings of Ramamoorthy for improved 3-D object reconstruction because of the “advantages of multibody 3D reconstruction” **(Fitzgibbon, Section 1, paragraph 6, line 1).**

5. As to claim 9, the combination of Ramamoorthy and Fitzgibbon disclose “wherein the reconstructed points are provided in a three dimensional space.” **(Fitzgibbon, section 3.1, paragraph 1, lines 8-10, where “3D point” is read as the reconstructed point in a three dimensional space. This is also found in Ramamoorthy [0156], lines 1-4).**

6. As to claim 10, the combination of Ramamoorthy and Fitzgibbon disclose, "wherein the images are provided in a two dimensional space." **(Ramamoorthy, [0040], lines 7-10, where X by Y images is read as two dimensional space).**

7. As to claim 11, the combination of Ramamoorthy and Fitzgibbon disclose, "further comprising the step of determining the actual motion of contours from image to image before projecting reconstructed points into an image." **(Fitzgibbon, section 3.2, paragraph 1, lines 3-11, "where determining the actual motion of contours from image to image" is accomplished by the minimization in equation 9, and "3D point Xp" is read as the reconstructed point.).**

8. As to claim 13 Ramamoorthy discloses "an apparatus (16) for providing contour information related to images, comprising: an image obtaining unit (18) arranged to obtain a set of interrelated images, **(Ramamoorthy,[0017], lines 1-3; where "image data sets associated with an object" is read as "interrelated images")** and an image segmenting unit (20) arranged to segment said images, **(Ramamoorthy,[0059], lines 23-26, where removal of the background is read as segmenting the images)**, and a contour determining unit (22) arranged to: extract at least two contours from the segmentation made by the segmentation unit, **(Ramamoorthy, [0129], lines 3-5 where "contours of each positive pixel group" is read as "at least two contours" further this process occurs in element 182 for figure 7 which is after the background**

removal, or segmentation in element 178), select interest points on the contours of each image, **(Ramamoorthy, [0133], lines 2-4, where contour points are read as interest points)**, associate, for each extracted contour, interest points with corresponding reconstructed points by means of three-dimensional reconstruction, **(Ramamoorthy, [0156], lines 1-3, where transformed contours is read as extracted contours and the contour points are read as the interest points)**, such that at least a reasonable part of a contour of an object can be determined based on the linked points. **(Ramamoorthy,[0156], lines 1-3 where "a three-dimensional surface model estimate" which is derived from "transformed contours" is read as "a reasonable part of a contour of an object" that the set of N points [0150] from the "transformed contours" is read as the "linked points")**.

Ramamoorthy does not specifically disclose "project the reconstructed points into each image, and link, for each image, reconstructed points that are not projected at a junction between different contours or their projections to each other in order to provide a first set of links."

Fitzgibbon, however, specifically discloses "project the reconstructed points into each image, and link, for each image, **Fitzgibbon, section 3.2, paragraph 1, lines 3-5, where "3D point Xp" is read as the reconstructed point),** reconstructed points that are not projected at a junction between different contours or their projections to each other in order to provide a first set of links, **(Fitzgibbon, section 3.1, paragraph 1,**

lines 8-10, where "3D point" is read as the reconstructed point, tracks are read as "linking", and the interface between the background and foreground objects are read as "a junction point between different contours")"

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Fitzgibbon with the teachings of Ramamoorthy for improved 3-D object reconstruction because of the "advantages of multibody 3D reconstruction" **(Fitzgibbon, Section 1, paragraph 6, line 1).**

9. As to claim 14 Ramamoorthy discloses, "Computer program product (44) for providing contour information related to images, comprising a computer readable medium having thereon: computer program code means, to make the computer, when said program is loaded in the computer: **(Ramamoorthy, [0059], lines 1-5, where element 32 in figure 1 is read to a computer and computer code),** obtain a set of interrelated images, **(Ramamoorthy, [0017], lines 1-3, where "image data sets associated with an object" is read as "interrelated images"),** segment said images, **(Ramamoorthy, [0059], lines 23-26, where removal of the background is read as segmenting the images),** extract at least two contours from the segmentation, **(Ramamoorthy, [0129], lines 3-5 where "contours of each positive pixel group" is read as "at least two contours" further this process occurs in element 182 for figure 7 which is after the background removal, or segmentation in element 178),** select interest points on at least some of the contours, **(Ramamoorthy, [0133], lines 2-**

4, where contour points are read as interest points), associate, for said extracted contours, interest points (J) with corresponding reconstructed points by means of three-dimensional reconstruction, **(Ramamoorthy, [0156], lines 1-3, where transformed contours is read as extracted contours and the contour points are read as the interest points)**, such that at least a reasonable part of a contour of an object can be determined based on the linked points. **(Ramamoorthy,[0156], lines 1-3 where "a three-dimensional surface model estimate" which is derived from "transformed contours" is read as "a reasonable part of a contour of an object" that the set of N points [0150] from the "transformed contours" is read as the "linked points")**.

Ramamoorthy does not specifically disclose "project the reconstructed points into each image, and link, for each image, reconstructed points that are not projected at a junction point between different contours to each other or their projections in order to provide a first set of links."

Fitzgibbon however, specifically, discloses "project the reconstructed points into each image, **(Fitzgibbon, section 3.2, paragraph 1, lines 3-5, where "3D point Xp" is read as the reconstructed point),** and link, for each image, reconstructed points that are not projected at a junction point between different contours to each other or their projections in order to provide a first set of links," **(Fitzgibbon, section 3.1, paragraph 1, lines 8-10, where "3D point" is read as the reconstructed point, tracks are read**

as "linking", and the interface between the background and foreground objects are read as "a junction point between different contours").

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Fitzgibbon with the teachings of Ramamoorthy for improved 3-D object reconstruction because of the "advantages of multibody 3D reconstruction" **(Fitzgibbon, Section 1, paragraph 6, line 1).**

10. Claims 2-4, 7, 8, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ramamoorthy and Fitzgibbon, as applied to claim 1 in view of Szeliski et al., ("Robust Shape Recovery from Occluding Contours Using a Linear Smoother", Journal International Journal of Computer Vision, Volume 28, Number 1 / June, 1998, Pages 27-44 herein after "Szeliski").

11. As to claim 2, the combination of Ramamoorthy and Fitzgibbon does not disclose that "wherein the step of linking in the first set of links comprises only providing links between reconstructed points or their projections associated with the same contour."

However, Szeliski discloses "wherein the step of linking in the first set of links comprises only providing links between reconstructed points or their projections associated with the same contour." **(Szeliski, section 2, paragraph 2, lines 1-4, where edgel is read**

as a projection because it is a representation of the 3-D reconstructed point, section 2, paragraph 3, lines 6-9).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Szeliski with the teachings of the combination of Ramamoorthy and Fitzgibbon for improved 3-D object reconstruction because their “technique produces a continuous surface description, i.e., a network of linked 3D surface points, which provides us with a much richer description than just a set of 3D curves.” **(Szeliski, Section 1, paragraph 6, lines 1-4).**

12. As to claim 3, the combination of Ramamoorthy, Fitzgibbon and Szeliski disclose, “where the interest points comprise junction points (J), **(Szeliski, section 2, paragraph 2, lines 1-4, where edgels are read as interest points that comprise junction points since it is based on an edge from an edge detector, section 2, paragraph 1, lines 13-14, fig 1(b) where edge detector outputs are referred to as edgels.),** where a junction point is provided at a location where two contours border each other.” **(Szeliski, section 2, paragraph 1, lines 4-6 , the examiner interprets edge points to be at a location where two contours border each other).**

13. As to claim 4, the combination of Ramamoorthy, Fitzgibbon and Szeliski disclose, “further comprising the step of combining, for a contour, the links in the first set of links provided in relation to each image for obtaining at least a reasonable part of a complete

contour of an object (step 40)." **(Szeliski, section 2, paragraph 4, lines 7-8, where "virtual surface is read as "a reasonable part of a complete contour of an object").**

14. As to claim 7, the combination of Ramamoorthy, Fitzgibbon and Szeliski disclose, "wherein the step of linking comprises linking, for each image, reconstructed points that are projected at a junction or their projections to reconstructed points or their projections in a second set of links." **(Szeliski, section 5.3, paragraph 2, lines 1-7, where the 3D position of an edgels is read as a "reconstructed point" and the edgels represent edge points which are at "junctions", and the epipolar line defines the "second set of links" since the epipolar line contains all candidate edgels section 2, paragraph 3, lines 3-5.).**

15. As to claim 8, the combination of Ramamoorthy, Fitzgibbon and Szeliski disclose, "wherein the reconstructed points that are projected at a junction in a majority of the images or their projections are linked in the first set of links." **(Szeliski, section 5.3, paragraph 2, lines 1-7, where the 3D position of an edgels is read as a "reconstructed point" and the edgels represent edge points which are at "junctions", and the epipolar line defines the "first set of links" since the epipolar line contains all candidate edgels section 2, paragraph 3, lines 3-5)**

16. As to claim 12, the combination of Ramamoorthy, Fitzgibbon and Szeliski teach the method according to claim 4, further comprising "the step of coding the images **(Ramamoorthy, [0164], lines 15-16; where "image blocks" contain the images)**, (step 42), where the information about the linked reconstructed points is used in the coding. **(Ramamoorthy, [0165], lines 7-9; where the encoded shape information results from the "three-dimensional surface model" [0156] that is made up of N contour points [0143] which are read as the "linked reconstructed points")**.

17. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ramamoorthy, Fitzgibbon and Szeliski, as applied to claim 4 in view of Yim et al.,(US Patent Publication 20020136440 herein after "Yim").

18. As to claim 5, the combination of Ramamoorthy, Fitzgibbon and Szeliski do not specifically disclose, "wherein the step of combining comprises only combining the links to points that have less than three links."

However, Yim specifically discloses, "wherein the step of combining comprises only combining the links to points that have less than three links." **(Yim, [0075], lines 6-9, vertices are read as points and the lines connecting the vertices are read as links. The combining occurs with vertices on the same line which constrains the number of links between the points to less than three, which are then combined).**

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Yim with the teachings of the combination of Ramamoorthy, Fitzgibbon, and Szeliski for improved 3-D object reconstruction because the invention enables “more accurate realistic CFD modeling of blood flow patterns.” **(Yim, [0021], lines 8-10).**

19. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ramamoorthy, Fitzgibbon, Szeliski, and Yim, as applied to claim 5 in view of Ye Zhang et al.,(“Robust 3D head tracking under partial occlusion”, Proceedings of the Fourth IEEE International Conference on Automatic Face and Gesture Recognition, 2000, pages 176-182 herein after “Ye Zhang”).

20. As to claim 6, the combination of Ramamoorthy, Fitzgibbon, Szeliski, and Yim does not specifically disclose, “further comprising the step of discarding, for each image, at least some of those reconstructed points or their projections to which links are provided from more than two other reconstructed points or their projections.”

Ye Zhang, however, specifically discloses, “further comprising the step of discarding, for each image, at least some of those reconstructed points or their projections to which links are provided from more than two other reconstructed points or their projections.” **(Ye Zhang, section 2.3, paragraph 5, lines 21-22, lines “V” is read as “at least**

some of those projections", Section 2.2, lines 3-7, discarding and "F" is read as links)

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Ye Zhang with the teachings of the combination of Ramamoorthy, Fitzgibbon, Szeliski, and Yim for improved 3-D object reconstruction because their "new post-regularization method based on edge flow is designed to reduce the accumulation error." **(Ye Zhang, Section 1.2, paragraph 3, lines 1-2).**

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. U.S. Patent No. 5933527 to Ishikawa, discloses contour extraction.

b. U.S. Patent No. 6487304 to Szeliski, discloses 3D reconstruction from 2D images.

c. U.S. Patent No. 6856314 to Ng, discloses 3D reconstruction from 2D images.

d. Boyer et al., "Object models from contour sequences", Lecture Notes in Computer Science, 1996 – Springer, discloses building 3D object models from object contours.

e. Bascle et al., “Region tracking through image sequences”, Computer Vision, 1995. Proceedings., Fifth International Conference on, pages 302-307, discloses contour based tracking with links.

f. Lui et al., “Layered Representation of Scenes Based on Multiview Image Analysis”, Circuits and Systems for Video Technology, IEEE Transactions on, June 2000, Volume 10, Issue 4, pages 518-529, discloses contour tracking with 3D reconstruction.

g. Heigl et al., “An Efficient Combination of 2D and 3D Shape Descriptions for Contour Based Tracking of Moving Objects,” Book Series Lecture Notes in Computer Science, Publisher Springer Berlin / Heidelberg, Volume 1406/1998, discloses 2D contour tracking with 3D reconstruction

h. Mech et al., “A noise robust method for 2D shape estimation of moving objects in video sequences considering a moving camera”, Signal Processing, 1998, pages 203-217, discloses shape tracking with 3D reconstruction

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL OTTO, JR whose telephone number is (571)270-3391. The examiner can normally be reached on Monday - Thursday 7:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Nabil El-Hady can be reached on (571) 272-3963. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/PAUL OTTO, JR/
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5/2/2009

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May 9, 2009